



Toys In Space

A Pre-Visit Information Guide for Teachers

Meets Rhode Island Grade Span Expectations: PS3(5-6)-8, ESS2(5-6)-8

On a January morning in 1993, the space shuttle Endeavour blasted off the coast of Florida carrying a high-tech communication satellite, an X-ray spectrometer, and a locker full of toys. Toys! The shuttle was full of cool toys for the purpose of teaching school children the concepts of force and motion. In 2002, a crew aboard the International Space Station continued the experiment with more toys from around the world. This updated workshop features experiments from both programs for more microgravity fun!

OBJECTIVES

- **Force and Motion on Earth:**
How much do we rely on force and motion in our everyday lives? Quite a bit, actually! Students will deconstruct seemingly simple actions into sequences of movements and reactions. Discover Newton's Laws of Motion, and how they relate to nearly everything we do.
- **Toys in Space:**
Students assemble at a series of interactive workshop stations...to play with toys! Students are challenged to unravel the mechanisms behind a series of toys. How does each toy behave on Earth? How would being in a microgravity environment, like space, affect the way each toy operates?
- **Toys in Space Video:**
So, what do you think your toys will do, if we were to send them into space? Fortunately, we won't have to leave the Museum to find out! The astronauts on the Toys in Space missions recorded tests of a variety of the toys being tested in space. How do your theories about how each toy would behave in space compare with the video footage? You may be surprised!

ACTIVITIES

Teachers are encouraged to conduct pre-visit and post-visit classroom discussions and activities with their classes to make the most of their experience. Go to: <http://quest.arc.nasa.gov/space/teachers/suited/6work.html>. Provide the students with a variety of tools. Students explore each tool, examining its properties, and how it is used on Earth. Will this tool work the same way in space?

If not, what adjustments can be made to ensure that it works properly in microgravity?

HELPFUL VOCABULARY

Newton's Laws of Motion-

- *1st Law- An object at rest tends to stay at rest, and an object in motion tends to stay in motion in a straight line and at a constant speed unless acted upon by an unequal force.*
- *2nd Law- In order to change the rate of motion of an object, a force must be applied that varies with the rate of acceleration and the mass of the object. Force equals Mass times Acceleration*
- *3rd Law- For every force, there is an equal and opposite force. To every action, there is an equal and opposite reaction.*

Force- The push or pull in a particular direction that can be applied to an object. Action that results in the acceleration of an object.

Gravity- The force of attraction between all objects in the universe.

Inertia- The tendency of matter to keep doing what it is doing: The tendency of an object not to change its motion.

Mass- A property of matter related to inertia. As the mass of an object increases, so does its inertia.

Microgravity- An environment, produced by freefall, that alters the local effects of gravity and makes objects seem to be weightless and able to float.

WEBSITES

NASA Toys in Space Video Resource Guides for Educators

http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Toys_In_Space_II.html

http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/International_Toys_In_Space.html

Science in Focus: Laws of Motion

www.learner.org/channel/workshops/force